

Daily Log #4

Date: 5 February 2002, Lesson length: 45 minutes

What did you expect students to learn during the lesson? Today we reviewed the anatomy of worms at the start of class and clarified the worm poster assignment that was to be done for homework. From knowing about the anatomy of worms, I wanted the students to learn how the digestion process can help the growing food waste problem in our school. The learning expectation for today was for the students to learn about vermi-composting as an efficient form of recycling. I wanted them to research in groups what vermi-composting is, how is it used, and how can it possibly help the community. This was an introduction to the essential questions: Why are earthworms important? How can earthworms be used to address the problem of excess food waste in society?

Describe the instructional strategies, learning activities and resources used by you and your students during the lesson. To make this assignment much more interesting I had the students believe that they were on a mission from the school student council to research worms as a possibility to help reduce food waste in the school cafeteria. I even had the student council representative in class help describe the assignment to make the assignment much more convincing. For sixth graders I noticed the students care more if it is presented as a kid issue. Their mission was to find out what was positive, negative, and interesting about vermi-composting.

I passed out a sheet with the scenario described at the top and explained their mission. They used this sheet to organize their ideas and data. I passed out folders with websites that had information about vermi-composting. Ideally, if there were more time, I would have brought the students up to the computer lab to do their own Internet research. I decided it would take less time to do the research if I gave each group printouts rather than bringing them up to the computer lab. Using the computers is also limiting because it would be difficult for the students to discuss and share their ideas. For sixth graders many of the students are still struggling with reading for important information. To help them organize their ideas I suggested that they make three columns on their paper: one column for positive facts about vermi-composting, another for negative facts, and the last for any other interesting information they found that might help the student council be more informed.

Because they were exceptionally engaged with researching about vermi-composting, we have to wait until tomorrow to discuss their findings. To conclude, I asked them to form an opinion, based on the facts, whether vermi-composting would positive or negative for the school.

Describe how you monitored students' understanding of the lesson's main concepts and what you found. As the students were researching, I was focusing the students on the information they needed

to have in their notes. I was asking them thought provoking questions which allowed them to take the information they were learning and infer new positive, negative, and interesting information about vermi-composting. For example, many of the students noticed that vermi-composting produces more worms. I asked them how that could be helpful for the school. They thought it might be a good fundraiser to sell worms to the community, so the community could start their own bins.

Describe how you accommodated student' learning needs during the lesson, and how you plan to adjust your teaching for the next lesson, if necessary, based on the students' learning today.

Working in groups of four helped keep all of the students on task. The stronger readers in each group helped the students that have difficulty with reading for information. For the ESL student and all of the students I provided a glossary with vermi-composting vocabulary to help clarify their information. I found this glossary on the Internet, but I think next time I will rewrite each term with a simpler meaning. In the future I will provide them with more than Internet resources for information. Some of the Internet information is a little advanced for my sixth graders, making it difficult to read and understand. I will try to find books or brief videos that might increase their understanding of vermi-composting. The textbooks we are using with the regular science curriculum are lacking information about vermi-composting; therefore, I did not attempt to use them. I think the students did a fine job working with what they had.

2/5/02

Are Earthworms the Solution?

Student #3

The Student Council has been given a small grant to start a recycling program in the cafeteria. They realized that a tremendous amount of food is thrown away each day. The Student Council heard that vermicomposting might be a possible solution to the problem. They do not have much information on this topic; therefore they are asking our class to research the topic because we are already studying earthworms. As a class, your mission today is to determine whether or not vermicomposting is beneficial for our school. What do you think would be positive, negative, or interesting about this type of recycling program? Organize your information below.

+ (good)	- (bad)	I (interesting)
<ul style="list-style-type: none"> • they will have moist soil and it won't dry out. • they will save money • it will last all year because it will be inside in the winter and outside during the summer • it will enhance your garden compost • it saves the environment • castings are full of nutrients • non-wax paper and cardboard can be composted 	<ul style="list-style-type: none"> • it will be bad because it will be a pile of garbage • it will cause problems if they too much on the first week • they will have to watch the worms • there are some things that you can't compost some foods • some materials don't want people garbage in your back yard • kids might make mistakes and throw bad foods in the pile that can't be composted 	<ul style="list-style-type: none"> • that worms can get rid of garbage and make rich soils • worms can multiply • enough worms to move forty tons of soil per acre every year • vermes means worms • Red wigglers are the best for composting • how are people going to be informed about vermicomposting?

What are some other facts we discussed in class?

Characteristics of Earthworms

The teacher provided a variety of resources which are identified below but not included:

- Worm Word Glossary for Teachers – www.cityfarmer.org
- Nature's Best Fertilizer – www.wormpoop.com
- Vermicomposting: Indoor Composting with Earthworms – www.state.ma.us
- Worm-assisted Composting – www.environmentalindustry.com
- Vermicomposting – Down to Earthworms, Kamloops British Columbia
- Earthworm Biology and Production – <http://edis.ifas.ufl.edu> (U of FL Cooperative Extension Service)
- Introduction to the Worm Farm – www.squirmy-worms.com
- Beginning with Worms - www.squirmy-worms.com
- Animals in the Soil – www.olywa.net
- Why is the Worm Industry Expanding? – <http://vermico.com>
- The Circle of the Food Chain and Decomposition – www.amnh.org
- Starting a Worm Farm – www.unce.unr.edu
- Why Earthworms? – www.unce.unr.edu
- A Helpful Home Guide to Composting – Tasman District Council
- A Helpful Home Guide to Worm Farming - Tasman District Council

Daily Log #5

Date: 6 February 2002, Lesson length: 45 minutes

What did you expect students to learn during the lesson? From discussing their research I wanted the students to learn how vermi-composting was positive, negative and interesting. This was a continuation of the essential questions: Why are earthworms important? How can earthworms be used to address the problem of excess food waste in society?

Describe the instructional strategies, learning activities and resources used by you and your students during the lesson. Since this was considered a Student Council issue, I had the student council representative mediate the class discussion. I did this because they believe that this representative will actually go to student council and voice their opinion. The students do not know that this is a made up scenario. I am torn for whether or not I tell them I made this situation up. They seem quite interested in pursuing the topic.

Getting back to having the representative mediate the class, I knew she could keep the students on topic. During the discussion I had her write the information on the board. This helped the students add to their notes. The only time I participated was when she needed clarification on an issue. I tried to stay neutral about opinions of vermi-composting.

Describe how you monitored students' understanding of the lesson's main concepts and what you found. While my students were engaged in class discussion, I was watching to see if they were participating, either by raising their hand and sharing information or by listening carefully and taking thorough notes. I also clarified some misunderstandings about vermi-composting as I saw necessary. I also kept reminding them of the focus of the discussion and asked probing questions to check for understanding. For example, they needed to be reminded that only red wigglers would be the best type of earthworms for vermi-composting.

Describe how you accommodated student' learning needs during the lesson, and how you plan to adjust your teaching for the next lesson, if necessary, based on the students' learning today. The students had many visual resources to record their learning. I started class having the students review and discuss their notes in their groups. This helped refresh their memories for the class discussion. I had the representative write the notes on the board for the children that have difficulty summarizing a conversation.

The note writing on the board made the conversation a bit slow and drawn out. Next time I will have another student record the notes on the board while the representative is mediating the discussion. I think this will give the discussion more energy and momentum. In the future I might divide the class according to viewpoint (positive or negative about vermi-composting) and make it more like a debate.

Daily Log #6

Date: 7 February 2002, Lesson length: 45 minutes

What did you expect students to learn during the lesson? Today we reviewed the steps of the scientific method. I did this because I have not given the students a lot of practice with experimental design. We then brainstormed which experiments would be necessary for learning how to build and maintain a vermi-composting bin. The experiment that we did today was about whether worms prefer a damp or dry environment. Students didn't know due to the lack of experiences they had with earthworms. This experiment is a continuation of the essential question: Knowing structure and function, what are the earthworm's needs and adaptations for their environment?

Describe the instructional strategies, learning activities and resources used by you and your students during the lesson. To engage the students for class I took a poll of the class to see if they thought there were benefits to doing more research for student council to consider vermi-composting in the cafeteria. I asked the students what the next step might be to pursuing this topic. They already knew the benefits. After a little thought they realized they did not know what was the actual approach to carrying out this process. They knew they needed to learn the conditions necessary for building a vermi-composting bin. I told them I was not going to give them this information, but they had to experiment with some of the environmental conditions to discover that information on their own. Today's experiment would be about whether earthworms prefer a damp or dry environment.

To reintroduce the steps of the scientific method I had the students brainstorm the order that would make sense for today's experiment. If a student volunteered with the correct step, I had them stand in the front of the room with a poster identifying that step. After this activity I passed out a lab sheet that guided them through this experiment. I reviewed all of the materials and how they would be used during the lab. It was really important for them to see the initial tray set up for the experiment. They needed to put a dry paper towel on one side of the tray and a damp towel on the other side. I asked the students why it would be important to make sure the worms were placed half on dry and the other half on wet. At first they had a little trouble coming up with why, but soon they realized that due to the fact the worm did not have eyes, they needed to feel the choice between both environments. We also had to discuss why it was important not to touch the worm or disrupt the tray while participating in the experiment. They figured out that it would add a variable not being tested for. We discussed why it was important to repeat this experiment a few times. It wasn't until after

the lab was complete that they realized the true importance to repeating an experiment. The students noticed that the worms did not consistently choose to stay on one side. There was one lab table that the worms, for some reason or another, choose to be on the dry side more often than damp. This helped the students think of some reasons why that might happen. For example, they noticed their worms seemed less mobile than other lab tables. After the lab was complete I drew a table on the board. Students tallied the numbers and concluded that worms preferred a damp environment. Next I asked them why, from their prior knowledge about worms, they thought worms preferred damp environment. They were able to remember that they needed to be damp not only to keep their segments movable, but also they needed dampness to breathe through their skin. I asked them how this impacted their view for making a worm bin. They responded that they needed to somehow keep the inside of the bin damp but not water logged or the worms would drown.

Describe how you monitored students' understanding of the lesson's main concepts and what you found. Student participation helped me monitor their understanding of the scientific process. Many of them had difficulty following the directions about how to do the experiment and record their data. For example, they were to watch the worm for three minutes and record the location of the worm after each minute. Some of the students thought that after every minute they had to re-center the worm between the damp and dry paper towel. They repeated the experiment three times, and as they learned the process, it became easier for them. I moved around the room checking to see if students were following directions and recording their data correctly. They also needed to be reminded to resist the urge to touch the worm during the experiment trials. I collected their lab sheets to see if they filled out the data table correctly and made conclusions based on worms preferring a damp environment. They seemed to do all right.

Describe how you accommodated student' learning needs during the lesson, and how you plan to adjust your teaching for the next lesson, if necessary, based on the students' learning today. I had the students work in groups of four to help those who might have had trouble with directions. Because four was a large group to be watching one worm, it was more interesting for each pair to be observing their own worm in the tray. This especially helped the students stay interested if one pair's worm wasn't moving and the other pair's worm was.

This lab was very structured because my plan for tomorrow was to take some of the structure away. I think they will still need a guide sheet that has the steps of the scientific method on it, but they can fill in the spaces for what needs to be done for each step. Today I forget to

include a materials list with the experiment. Tomorrow I will have to discuss this missing information and why it is important.

Name: _____

2/6/02

Worm Experiment 1

Question: Do worms prefer damp or dry?

Hypothesis: I predict the worm(s) will choose damp.

Experiment Directions:

1. Cover one half of your worm tray with a damp paper towel.
2. Cover the other half with a dry paper towel.
3. Place your worm in the center of the paper towel: one end on the damp, one end on the dry.
4. Watch your worm for 3 minutes. Record where the worm is located each minute, damp or dry. Repeat 2 more times.

Observations:

Trial Number	Minute 1	Minute 2	Minute 3
Trial 1	damp	damp	damp
Trial 2	damp	damp	damp
Trial 3	both	damp	damp

Results: How many times did the worm choose: damp 9 dry 1

Conclusion: This worm prefers: damp ☒ dry ☐

Why do you think this happened?

I think this happened because they are trying to keep their skin dry so they can breathe through it. Also, they need to be able to glide across surfaces so they need to stay moist.

Did you mean damp?

Daily Log #7

Date: 8 February 2002, Lesson length: 45 minutes

What did you expect students to learn during the lesson? During this lesson I wanted the students to again use the steps of scientific processes to discover that worms prefer a dark environment to a light environment. I also wanted them to brainstorm and discuss new experiments that could be done to learn more about worms to give them an appropriate environment. This experiment is a continuation of the essential question: Knowing structure and function, what are the earthworm's needs and adaptations for their environment?

Describe the instructional strategies, learning activities and resources used by you and your students during the lesson. I reminded students of the importance of learning about the best environment for worms. Again it was not so obvious to them what the outcome of this experiment would be.

After writing their questions and hypothesis for this experiment on their lab sheet, I showed them the materials they were going to be using. One student identified that they would be using a damp paper towel at the bottom of their tray because they knew that it would make the worms a bit more comfortable for reasons discussed yesterday. The only different material used today was a piece of black construction paper. I asked the students what they thought the purpose of the black paper was. One student volunteered that it would be used to cover half of the tray to act as the dark side. As we were discussing how the experiment was going to take place, they were writing the directions in their own words on their lab sheets.

I asked them why it was important not to touch the tray or worm during the experiment. They remembered that it would act as another variable that we were not testing for. Prior to the start of the experiment I asked students if there was any other important information they needed to remember. They remembered that they needed to expose the worm to both sides of the tray to give the worm a choice and to watch the worm for three minutes recording their data after every minute. Also they needed to repeat the experiment.

When each table completed writing their directions, they were allowed to gather their materials and start the experiment. They worked with two worms in a tray and each pair kept track of their worm.

When the students completed the experiment, I drew a table on the board and asked them for the results of their experiment. Students identified that the worms preferred dark. I asked the students why they thought the worms choose dark, and they needed a few seconds to think about it. They all agreed that it would take a worm a lot longer to dry out exposed to the dark than being exposed to the

sun. I asked them how this would affect the building of the worm bin. I showed them one model that was made of clear plastic and another made of opaque plastic. Once again, I had to give them a little time to think and then took a poll to see which was model best. They said it would be darker in the opaque container. One student recommended that they could use the clear plastic container as long as the sides and lid were covered by something dark during the day.

I asked them to think about another reason why they would want a dark container. I asked them to think about when and how worms get their food, if it isn't always underground. After some thought and discussion, they realized that worms must be active at night, safely eating the food on the surface. I asked them why that was an important piece of information. One student responded that if the entire container were kept dark including the lid the worms would be able to compost throughout the container.

Next, I asked them to brainstorm additional experiments that would be useful to making the worm bin. The students decided that they should find out if worms prefer a warm or cool environment. They noticed from earlier research that there was not any consistent information about proper temperature. They realized that they needed to find a location for the worm bins and temperature would be the deciding factor.

Describe how you monitored students' understanding of the lesson's main concepts and what you found. Through class discussion and small group discussion, I was able to verify that the students understood how to carry out the experiment and learn important information from this experiment that would impact the building of the worm bin. I also collected the lab sheets that they completed and saw that all of the students really understood the scientific process for carrying out an experiment.

Describe how you accommodated students' learning needs during the lesson, and how you plan to adjust your teaching for the next lesson, if necessary, based on the students' learning today. I had students work in groups of 4 and also in pairs to help those having difficulty with directions or writing. Today's lesson was very structured using a lab sheet. Tomorrow I will have students try to write up the experiment on their own. This will show me that they understand the steps need to be done in order. In future units I know more experiments need to be arranged using the scientific method to help students be more fluent with this process.

Name: _____

Student #3

2/7/02

Worm Experiment 2

Question: Do worms prefer light or dark? ✓

Hypothesis: I predict the worm(s) will choose dark. ✓

Materials: Worm(s), timer/stopwatch, black piece of paper, square tin, damp paper towel,

Experiment Directions:

Good Directions!!

1. Put damp paper towel in the square tin, ✓
2. Cover $\frac{1}{2}$ of the square tin with a piece of black construction paper.
3. Place worms between the two halves, ^{how?}
4. Watch worm for 3 min. and record where the worm is each minute. Repeat 2 more times.

Observations:

Trial Number	Minute 1	Minute 2	Minute 3
Trial 1	light	light	light ^{interesting?!}
Trial 2	dark	dark	dark ✓
Trial 3	dark	dark	light

Results: How many times did the worm choose, dark 5
light 4. ✓

Conclusion: They prefer dark. ✓

Why do you think this happened? I think because the light could dry the worms out and the soil is dark.

↑ Why is that a bad thing?

Daily Log #8

Date: 11 February 2002, Lesson length: 90 minutes

What did you expect students to learn during the lesson? Today I wanted the students to decide on the best location for the worm bins, whether they should be located in a warm area or cool area. I also wanted them to do further research about building a vermi-composting bin and providing a healthy environment for the worms. This experiment is a continuation of the essential question: Knowing structure and function, what are the earthworm's needs and adaptations for their environment?

Describe the instructional strategies, learning activities and resources used by you and your students during the lesson. Many of the students brought in the materials needed for today's experiment. They explained to me how they were going to be used and why it was important to do this experiment. It did not take them too much time to get started and carry out the experiment. They were very excited that they were in charge of planning all aspects of this experiment. When they were finished with the experiment, we again posted the results of all of the pairs on the board. They identified that the worms preferred a cooler environment. They decided that it would be best to keep the worms near by the cafeteria in a cool spot, away from any heat sources.

Next, in the groups of four, students went to the original information packets I made for them to learn the importance of vermi-composting to find additional information about preparing the worm bin. They recorded their information on a sheet provided to them. After recording the information, we discussed what they had learned as a class.

Describe how you monitored students' understanding of the lesson's main concepts and what you found. Today I spent much of my time walking around the room to make sure students were headed in the right direction with today's experiment. Surprisingly, all of the groups were carrying out the experiment just like the other two previous experiments were carried out. They were very enthusiastic about doing this experiment because it was their idea.

Other ways I monitored my students was to have a class discussion about how all three experiments impacted the making of the worm bin. Tomorrow I will collect their formal written experiment to see if they understood the steps of the carrying out an experiment and learning from the experiment.

Describe how you accommodated students' learning needs during the lesson, and how you plan to adjust your teaching for the next lesson, if necessary, based on the students' learning today. Working in groups helped guide some of the students that struggle with writing and following directions. They also worked in their groups of four to do the research to find the best conditions for a

worm environment. For those who needed a challenge I told them to try graphing the information from today's experiment using their data and also the class's data. The ESL student appears to be keeping up with the class because she is working next to a capable and understanding student. I feel that I did not spend a lot of time showing the students the different ways to represent data. In future labs I think I will be expecting all students to graph their results to help them interpret data and draw conclusions.

Worm Experiment 3

Question: Do worms prefer warm or cool?

Hypothesis: I predict that worms will choose cool.

Materials: The materials needed are:

- . ice pack
- . tin plate
- . warm towel
- . pencil & lab sheet
- . damp paper towel
- . worm(s)
- . stopwatch

Experiment Directions:

1. take a tin plate, and place a damp paper towel in it (because worms prefer dampness).
2. on one half of the tin, put a ice pack under one side, and the warm towel under the other side.
3. place the worm(s) in the middle and start the stopwatch.
4. while you are timing, push the plate down on the two sources so that the worms can feel both.
5. After one minute is up, right down the result on the space provided.
6. watch your worm for 3 minutes, and repeat 2 more times.

Observations:

Trial Number	Minute 1	Minute 2	Minute 3
Trial 1	Room temperature	Room temperature	Room temperature
Trial 2	Room temperature	warm	cool
Trial 3	warm	Room temperature	cool

Results: The worm picked, warm~ 2, cool~ 2, and room temperature~ 5.

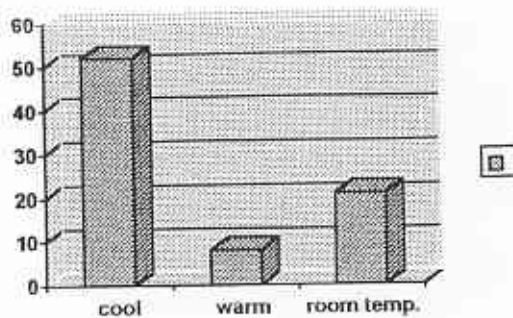
Conclusion: In conclusion worms prefer cooler temperatures over room, and warm.

In conclusion, my results state that worms prefer room temperature. I got 2~warm, 2~cool, and 5~room temperature. The classes results show that worms prefer cool because they got 8~ warm, 52~cool, and 21~room temperature. I think this happened because the room temperature was pretty cool so both results sound correct.

Lastly, from all three of our experiments it shows that worms prefer, cool, damp, and dark environments. We used the black paper for dark and light, the ice pack & washcloth for cool and warm, and towel & damp towel for damp and dry.

Why do you think this happened? I think this happened because if worms like damp then most things that are damp become cool. Also they live outside where it rains, cold rain, and the weather is sometimes cool. For darkness, I think they prefer dark because the dirt/soil that they live in is black, or dark. Lastly, I think they prefer damp because when it rains outside, the dirt becomes wet and their environment becomes damp.

Class Results:



Worm Experiment #3 Grading Rubric

The objective of this experiment was to determine the environmental conditions for vermicomposting.

Question (1 point)

Points Awarded: 1

0 points: no question stated

1 point: question stated

Hypothesis (1 point)

Points Awarded: 1

0 points: did not answer question

1 point: answered question

Material (3 points)

Points Awarded: 2

0 points: did not list materials

1 point: incomplete list of materials

2 points: complete list of materials with no quantities indicated

3 points: complete list of materials with quantities indicated

Directions (6 points)

Points Awarded: 5

0 points: no directions indicated

2 points: directions are incomplete and disorganized

4 points: directions are generally clear and complete with a minor error or omission *How will the worms be placed in the middle?*

6 points: directions are clear and complete

Data (3 points)

Points Awarded: 2.5

0 points: no data reported

1 point: no data table, or the data table is incomplete and disorganized

2 points: data table is generally correct and clearly labeled with a minor error or omission *What do you mean by room temperature?*

3 points: data table is well organized and clearly labeled

Results (2 points)

Points Awarded: 1 *for graph Nicely Done!!*

0 points: did not include results

1 point: included your own results

2 points: included your own and class results

(Extra point for graphing class or own results)

Conclusion (6 points)

Points Awarded: 3

0 points: no conclusion reported

2 point: conclusions are not supported by the experimental data and results, are unclear, disorganized, or illogical *The conclusions seem disorganized and unclear. They do appear accurate*

4 points: conclusions are generally clearly stated and supported by experimental data and results, except for a minor error or omission.

6 points: conclusions are clearly stated and supported by the experimental data and results

Format (3 points)

Points Awarded: 3

Experiment was typed ✓

Organized Lab Format ✓

No larger than 14 pt font ✓

0 points: no

1 point: yes

Overall Points Awarded: 19.5 out of 25 points

Grade: C⁺

Please look over this rubric and correct your write up! I can tell you spent a lot of time on this so please fix your mistakes to increase your grade! 93 SC02